Notebook Series -- Notebooks by Edison and Other Experimenters
Disc Plating Experiments
Notebook, N-20-08-18.2

This notebook was used by Edison during August-September 1920. The entries pertain to the plating processes involved in the manufacture of disc records. The notes describe efforts to improve the surface of disc record molds by polishing the copper masters with a rouge mixture and the nickel-faced females with an emery paste. The entries also report attempts to improve the plating by changing the acid and copper sulfate content, by improving the filtering operation, by adjusting the plating schedule, and by applying a coat or rubber solution to the back of the mold to prevent copper and nickel deposits. Inserted into the book is a note from Paul B. Kasakove to Edison describing a mold plated with a copper shot anode. The cover is labeled "T-A-E No 4 Plating Disc." The pages are unnumbered. Approximately 75 pages have been used.

E-2458

N200818.2

Aug 18/20

Our little Cu bath had 140 grms Blue Vitriol to liter. 34 gals, 9 acid. Anistripping dipped in 1 1/4 for 30 sec gives dark burnt deposit — We then put in 26 lbs of Blue Vitriol Extra Then stripping 1 1/4 in showed OK Copper except 3/16 strip at Extreme Edge which was dark burned. We Electro Cleaned the stripping previously — Acid unchanged

opposite 1/16 red - Thin in bright side

We now will add Ten lbs more Blue Vitriol which will I calculate bring CuSO4 up around 285 grms per Liter, 310 being Saturated in water at ordinary temperatures

C13

Aug 18/20

The Cyanide process used by Dempsey for determining Copper is not adapted to testing our baths when Nickel is in anodes. as any Nickel dissolved functions as Copper (10) counts as Copper & thus throws one off as to amount of real Copper in solution.

The big solutions are not high in Ni yet. But our Experimental baths have to our great surprise more Ni than Copper

Doughtery is to introduce a different test determining real Copper content & Nickel as well as Iron & we will not get off again — Our rejections of moulds have reached a very high figure

Mostly due to gas dents in Ni
Plating or in Copper backing
the copper dont weld to
Ni — always 25% fail to
weld + always on side
the disc is put in —
Probably burns edge +
deposits red sponge + subsequent
Copper shrinks away as burnt
Copper dont adhere.

Our Cu bath before we
put in the more $CuSO_4$
had 34 grals we put
in 36 lbs of $CuSO_4$

Old assay

Free acid	9.03 grms per liter
$CuSO_4\ 5H_2O$	142.79
$NiSO_4\ 7H_2O$	176.53
$Fe_2(SO_4)_3$	3.43

This shy of acid in #24
may be one of the causes
of heavy discards of self stripping
Acid is a good cleaner

Aug 18/20

Doughtery tells me that
the Old formula for
Copper baths should be
this

Spec g about 1.170 –
Free H_2SO_4 25 grms Liter
Blue Vitral – 200 " "
This shows they have a little more Cu than necessary
but very shy of acid,

Our little bath since I added
36 lbs Blue Vitral
will probably have
270 to 285 grms Blue Vit
per Liter + 22 grms H_2SO_4 free
per Liter, + 175 grms per
Liter of Ni_2SO_4

Doughtery advises
that do the nickel in

Our big bath rises above a predetermined point that we remove say 1/3 of sol Boil down + crystalize out the $CuSO_4$ + use for making new solution, + the $NiSO_4$ purified by $NiCO_3$ at Lake -

Today - Big bath analysis
#22A SpecG 1.172. H_2SO_4
1859 grms per Liter
223 " " $CuSO_4$

22B -
SpecG 1.162, H_2SO_4 13.17 grms per Liter
$CuSO_4$ - 216 grms per Liter

#24
SpecG 1.161 - H_2SO_4 12.69 grms per Liter.
213 grms per Liter $CuSO_4$

Our Ni filter press - Must
change cloths every 24 hours
The cloth is thinnest that is
used in filter presses & you
can hold it up to the light
& see its nothing but a
sieve & only does good
filtering when fully covered
with the dark colour mud
but before could accumulate
enough it lost its filtering
power yet we had 50 lbs
pressure on - Moore investigated
& found that the rubber ferrules
were all out of line that
cloths never put in obtained
& the pressure closed the
water channels the rubber
ferrules ~~are~~ deformed not
being in line & closed up
so liquid did not get to
cloth etc —
Moore went over to see
Denvers Expert, & got
information & thinks

Lettering Cloth also
lined up the ferrule inlet.
Unbatched the Cloths &
now instead of pressure
rising to 50 lbs in 24
hours, its gone 24 hours
& pressure is only 12
lbs —

He will put in new cloth
double as thick as cloth
now used, new ferrules
lined up, & fix the holes in
Checkerboard so cloth
Cant close them & try —

Showers mean scaps fellow
Cloths should be boiled
in water 2 or 3 hours —
Cool off — Cut loose &
put in — & when removed
from press cleaned &
boiled again for short
time & put in wet (1e)
moist, & said cloth

L Vinson
Night Chief Supt
Plating Plant

Closed last several months
+ stand 1/4 to 1/2" of mud -

Copper backing
Have just discovered cause of
series dents - its due to high
density making gas bubbles
in cleaner or in Copper backing
The gas insulates the Ni
+ the edge has great density
and builds up red brass

Note

Aug 19/20

All experiments with edge of disc 1¼ inch in liquid bath Cu + Ni – ~~[illegible]~~ put in bath with. Current on full, show burning bad with low Copper in sol it improves very much with very high Cu Content, + still more with acid 20 grms to Liter –

Our Exptl Sol is loaded with $NiSO_4$ – Reg Wks solution has been stronger than ever

With 4 amp. a board not cleaned shows if only in 2 or 3 minutes that ½ of the whole surface is not plated over the Music grooves at bottom not plated at all where ball goes No finger marks deposited on it takes a long time 10 min before the stains + dirty parts Cover, Hence we really

Note

at first have a plating area only 1/2 to 2/3 of what we thought we had, hence the closing of the full current on such a reduced surface + also to fact that the Edge has 50% more current go to it than any other parts gas is formed. also dirt pencil has an edge all around it + the Edge has high density. hence bad dents ~~blisters~~ from dirt pencil + gas + stripped face due to burning + formation on red porous ~~copper~~

By plating at a low density of 4 amp no burning or gas made the Edge around dirt pencil has very low density + forms no Craters to

Produce cavities —
So that in 2 or 3 hours
we have .001 thick of
plating not burned and no
gas + chemically clean
then when we put full
16 amps on no change
of disc is noticed on exit
from liquid in rotating

We are going to put Res
Coils on amp meter side
of circuit — + abandon
reading with 1 amp
meter, We propose —
polishing the female
by once over in polisher
clean in water jet cleaner
with brush Bunce distilled
water, then Electro cleaner
15 sec. 8/4 — for 30 seconds

Wash, rinse distilled
Put in bath wet, rotate
3 or 4 revolutions to
permit acid to dissolve
any oxide then close
Coil switch which is
adjusted to 4 amperes
Leave on 3 hours –

This gives 12 amp hours
deposits 001 sheet,
Then ~~close~~ throw
switch over to full
Current say 16@17
amperes to Plate for say
50 Hours –

note

S
1

Aug 19/20

At last we know why trees grew on the Edge of our Rounds in Experimental Lab Some 3/4 in in middle + 1/2 at Edges While practically none grew from Discs in Big Works Bath

It was due to the fact we had only 142 grms of $CuSO_4$ to the Liter while works has 220 to 245. They also had 15 grms H_2SO_4 + we only 9 — When we added 36 lbs of $CuSO_4$ + 300 cc acid we went higher in $CuSO_4$ than works probably 290 grms per Liter + perhaps 18 grms acid

After this our discs no longer gave trees + act like works, after 26 hours plating is fine

Notwithstanding we have
176 grms of Ni to date
in addition

Made some Res coils for
4 amps on $9\frac{1}{2}$ V for
Copper baths. 39 of them
& will start all backing
of Ni moulds with
3 Hours at 4 amp then
full Current for 50 Hours

Will also get coils for
3 ohms for Nickel
baths & plate 3 hours &
then Throw over to full
Current. With 39 nickels
& 78 or one Cu Table
we can determine Value
of this process

Aug 19/20

Noticed a female Ni plated put in Circuit Open - 3 Revolutions made & switched closed with 4 amp coil - That it required 7 minutes for the tint to even up so uniformly coated -

We will try putting another Ni Coated in with the 4 amp on & see how long it takes.

Also another like the first but will brush it ~~[illegible]~~ see if after taking out of Ni bath & washing, if Brushing does good, ~~that~~.

We find that putting in 4 amp with Current on didnt clear up in 7 minutes, but the difference in tint was marked the one put in without Current ~~had~~ 3 relations & then put Current on showed a bright Copper tint on half & the other dark tint disappearing in 7 mins

Whereas the one put in with Current on showed a bright tint & other half a Red tint & didnt disappear for 7 minutes & now after 20 minutes the 2 tints are distinct

From this we Conclude that putting in with Current on is not good

(31)

We put another in without Current on but brushed —
This acted no better than the one put in without Current & not brushed — 4 amp

We will now put one in which is Electrically Cleaned with Current off - 4 amp -

Note — The high matrix they said they couldn't get a good sample I put it in Nickel 3 amp after Cleaning 15 sec 8/4 till it got red — Then transfd to our Cu bath 4 amp put in Current off — after a Revolution put current on — 3 Hours, then

Note

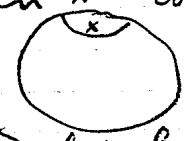
Put full Current on but it showed no tint as it came out.
Showing the same as another disc did the same way + 3 hours 4 amp full current until Total 72 amp hr.
Tinting of 1/2 the record is due to oxidation, stains 8/4 film, etc - but once its covered by chemically clean metal increasing the Current 4 times shows no change

Notice 2 females put into the bath 4 amp - that in No 1 was bright when put in + quickly covered. That in No 2 was tinted by solution + other irregular causes dark

but after 1/2 hour you can still notice the dark tinted spots in places.

This should warn us to clean our working females when they are contacted by running them through the polishing machine at least once over and very good twice over using 30 sec 8/4 But never using electro washer more than 15 sec & Brushing in water jets. Care being taken that 8/4 should go 1 minute strength to the test Copper

The stain x is due to



Some kind of oil leaking in on a blister, probably

Copper + the acid attacks the nickel corroding it the dark tint being corrosion shadows. I have noticed this corrosion on many moulds, spots or patches specs in music ~~book~~ grown looked like dirt plated in were shown when light was right that there was no speck of dirt but it was corroded + when light right showed all metal. Originally it may have been dirt + it had fallen out.

Aug 20/20

One of Cullen discards which he put in bath & hesitated, shows a big blister, 1½ area — two dents were on the surface. These on Ni stripped showed traces of copper-lint.
The stripped copper surface was clean — I cut blister out & found the dents. Somehow the blister was raised up but the 2 spots producing dents stuck & then peeled Ni down while gas pressure aided to strip the Ni from the copper
The pressure must have been very high to overcome this obs & pucker this spot was easy dropping

Whereas all adjacent area was clinched, gas probably leaked into this area thru one of the dents.

Took a discard nickel faced female.
Put on polisher & went over it with Emery & brush on machine

|||| |||| — Examined. No wear

I start on another 10 times over.

|||| |||| — This makes 20 times over = No wear is perceptible so far —

|||| |||| This makes 30 times over
I cannot detect any wear of big waves or any where no scratches —

|||| |||| This makes 40 times
no wear detectable —

NOTE

~~IIII IIII~~ 50 times over with
SF XXX Washington Hole Flour
Every one wear - no scratches

I will now treat the
mould which has been
polished 50 Times &
shows no signs of wear
with 8/4 diesel for 1 minute
without washing Flour
& then polish to see
how many 8/4 treatment
I can go at 1 min strength
for Copper & grind the
surface off to note wear

MISTAKE

All these Experiments
with grinding solution
is with a FEMale

|||| |||| 50 times over by
flour Emery & Tooth Brush
All these results are
with a female
& this would show
wear like a Male
I will now polish
a MALE & see
how many times
it goes without
being flat Top-
I now polish a
working Model - Male
|||| |||| 10 times Count are
wear except
Chatter Marks
show still but have

Note

Disappeared from the top, but some had worn off making records as this is a working model of the process.

On 20th Aug 348 Discs removed from Baths of which only 10 were discarded in the Control room which is abnormally high. These went in 2½ days previous or say 54 hours.

About the time they were put in we brought acidity of baths up for mechanical 24 wells bad at from 12,30 grms acid to 16 about.

Also we had better following in 24.

Also added very much more acid in Nickel

Also new a better following of Ni sol + Cu Sol in 24.

Aug 21/20

Complete test by Doughtery of the Copper Solutions in 22A + B + 24

	22A	22B	24
Specg	1.175	1.174	1.167
Free H_2SO_4 grams per Liter	14.44	17.59	14.57
Blue Vitriol	231.31	227.32	218.58
$NiSO_4$ 7aq	16.75	27.38	17.47
Fe	0.713	0.824	0.646

Dempsey is adding acid freely. When he started it moulds that went in after the addition of 1st lot had low repetions 2½% in Control room 328 taken out previously # 24 only had 12 acid.

The reason disc come better when acid increased day in #24 from 12.47 grms per Liter to 22.58 grms per Liter is due to the stronger acids cleaning power on the disc when first put in also in a measure to better Conductivity & greater Efficiency of the anode.

25 grms free H_2SO_4 is the standard but owing to a poor test method it had fallen to 12½ grms & discards got very high = 10% but it to 19 & this immediately improved the OK discs in Central room & probably in Lathe & Press room from which it's hard to get Reports —

Aug 23 - /20 See last page

D'Emasy has added more pure H_2SO_4

Baths now tests Eq new method of testing

#24	Spec G	1.170	
22A	"	1.180	
22B	"	1.180	
#24	Free H_2SO_4	22.58	
22A	"	20.95	25 is OK
22B.	"	20.75	
24	$CuSO_4$	229.29	
22A		236.96	
22B		234.92	

Disc coming good in Central room —

25 grms H_2SO_4 free acid in Cu baths is standard

23 Aug/20

I have noticed several times that moulds which have flat tops on all the music waves & produce records which are very bad & should never get shipped that the flat tops are all mottled

Bright & mottled –

May be due to spongy Ni – To Fe Chloride to which record being pressed against something hard in Lathe room

The moulds making the record was running & [illegible]

it pulled off - It shows very bad that tops as well as the record from it —

I will polish top of it helps & also make a test record —

Aug 24/20

Kasacova has 5 men in his dept & will take on one more from Mike Costa who he has been using

E Mooney	Jocendin
V Mesa	"
J Gross	"
M Campesi	Andy Bergen
S Cozza	"

He has made Experiments & finds with Cloth separators & Mapla hole depo no practical difference in compare

(57)

He is changing over to Maple as fast as he gets them —

Aug 24/20

Present Schedule on Presses

2: on Contact - 90 lb pressure -

10 minutes on high at 850 lbs average

1st temp 180°

Last temp - due to steam at pressure presumably 125 lbs

We take 50 of first moulds out of baths that reach Control room & follow them to Press Room to get OK moulds –

Aug 20th/20

Control –		None
Lathe	1	Cracked
"	2	Loose Ns
Presses	5	Small Defects
	1	Cracked
	1	" Rough
	10	

80% OK –

Aug 21

Control	2	Bounded
Lathe	3	Cent[illegible]
"	2	Loose Ns
	1	[illegible]
Presses	5	[illegible]
"	1	[illegible]
	14	

72% — 74% [illegible]

August 22

Control	2	Bent,
Lathe	2	Broken Center
	1	Loose Ni
	3	Group Defects
Presses	5	" "
"	1	Pitted - rough
	14	

72% - 80% Plating

Aug 23

Control	3	dents
+	3	Scratched
Lathe	2	Broken Center
"	2	Pitted
Presses	2	Group Defects
	12	

76% 86% Plating

Aug 24th/20

Control none

press-

7 Broken Center
2 Dents
1 Porous
1 Buckle

Presses 2 group Dents

13

74% OK 88% Plating

Aug 25/20

Control 0 —

Lathe 2 Cut thru label
1 Copper bottom ?
1 Pitted

Presses 2 Rough plating - Pitted
6 Group Dents
1 Dent + Scratch
1 Mechanical injury

72% OK
90% plating

Aug 25/20
326 Models today only
1 Discards 1 a scratch
1 a Dent.

26th – 50 Moulds

Control	none
Lathe	3 Dents
	4 group dents
Press	1 Pitted
	8

– 84.6% OK

50 Records

27 – Control –	none
Lathe	2 broken Centers
	1 plating Defects
Press	4 group Dents
	1 Pitted
	1 Buckles
	1 Roughness plating
	1 Buckled

10 all told – 80%

Pure plating 86%

28 Aug – 50 Moulds

Control	none
Lathe	1 Broken Center
	1 plating dent
	1 Worn label
	1 Burned Copper
Press	1 Series dents

84% OK all

90% OK Plating

Aug 31

Control	none
Lathe	1 Dent
Press –	2 – Series Dents
	3

94% OK –

To this point 78.8% of all OK

85.2% Plating only

Aug 26/20

In screening out old shot
Ni anode stuff thru 10 mesh
That is to be used again
The old + new mixed should
Either be well washed
to get rid of clinging black
hydroxide, or the baths
should be filled nearly to
overflow + allowed to
settle before get to turned
on otherwise there will
be lots of float which
may get on discs + also
muck up filter cloth

Aug 26/20
Copper Baths

	Sg	H_2SO_4	$CuSO_4$
22A.	1.180	21.09	237.47
22B	1.180	21.22	235.94
24	1.180	22.45	220.11

Aug 27

	sp.g	H_2SO_4	Blue Vit
22A	1.183	22.46	234.70
22B	1.179	21.22	223.67
24-	1.183	23.50	244.40

Aug 27/20

Think we have a good Rubber Dope for backing moulds which is non inflammable. Rubber dissolves pretty well in Carbon Tetrachloride well give it a good trial

I polished with Rouge & glycerine on Copper Mould it does it pretty good without materially reducing Chatter marks only on tops of largest undulations & then can still see after twice over. Think can polish 5 or 6 times which should give 18 to 25 impressions - probably over over after 3rd run example

I will also try SF 12X which is much finer than SF XXX our regular Emery

Note - We cut in two Reg wood handle tooth brush & make 2 polishing brushes -

Polishing Machine.
1 in Control 1 shift
2 in Lathe. 1 shift
once over -

2 Machine Press dept 3 shifts -
Total 6 machines

Possibly 1 in Master room -
We will use amp 12 one to start -

Echos are not brot in when phono is 1" out level either way —

Curious — Caldwell + Neil faked out 10 Records without starting Echo + 10 with them —
I found all had the Echo — With rough start on Machine their Ear accommodation rendered Ears insensitive while with smooth starts the accommodation muscles didnt work + their Ears were sensitive + could hear Echo
But my accomodtn muscles are gone + I hear Echos on rough starts

Aug 27/1920

Dr. Sn Sol for wiping moulds

1st Solution. 500 grms CP Sn Chloride.
to One Gallon Alcohol

2nd Solution -

4 oz of the above to
One gal Alcohol. the Later
is the solution used

~~To be corrected Later~~

Thermometers for use
throughout factory
Where temp to be
measured don't
212° Fahr should be
alcohol colored Red
& float broad stream of red
These can be read
Easily from a distance

in dim light.
The type is No 6738
in Emery Amends Catalogue
80 cents but can be
got Cheaper

Today Mac brought in a female & Male discovered today. The Male for dents;

3 of them like this —
nothing could be seen on female — There were 3 dents in a row

These dents were made by
3 seperate rattlen wood
febers floating in bath
& attaching to female
Cause urgency to shed
on female

Aug 27/20

Experiments on ~~cont~~ start repeat
and real after Echos

Tried Reg Schedule still in
" old Schedule - to wait
Contract, 2 min 300 lbs
2 min Then 800 lbs
12 minutes still in
both Echo before & after
Tried Reg Schedule +
Took it out hot about
160° Fahr - still both
in

over

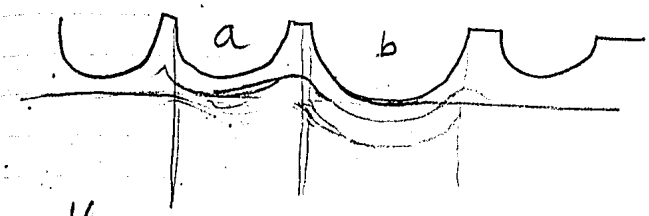
tried Reg schedule now in Vogue but with 600 lbs final pressure instead of 800 – still in but no so prominent

The Hounds we are using is very bad.

Hallo –
Yet this was a full throw good print – its [illegible] it didn't make a poor print –

Regular Schedule cut only 400 lbs final pressure –
Bad print as expected but I can scarcely get the Echo – While in Reg record its loud + distinct

Possibly



flows under + raises under adjacent groove before it reaches face of blank when b reaches bottom a is above + this flow from b must pack it tighter hence pressure on a is above normal due to flow of blank from "b" + this difference in density causes a spring up in a when pressure relieved on blank

I find that 3 times over polaroids a very dark working mixed good ~~not~~ with finer emery than SF XXX which we are using +

The very fine is SF 12 X It is the only one that should be used on C.B. paper

Send for 20 pounds

Took Reports of 273 Record faces by Caldwell - Ingmund + Neil

31% had Echos + Repeats.

Consisting of 14 Echos

80 Repeats, true Echos

Many were Dupes Records, Covered 40 faces of dupes.

All thin those that were OK showed no repeats

those which had repeats always had repeats

Aug 28/20

There is no longer any doubt that the wiping upstairs produces flat tops and that polishing increases the loudness, but the Volume Even after polishing is Very Noticeably less than when new. Cannot say if it is due to the $SnCl_2$ or not, Or due to movement of the hard blank on the Tops of matrix waves
I am inclined to think this is Cause, or movement of Mould on hard blank several hundred times

A trial of rubbing a matrix (Mtfaced) with Edge of a record clearly shows it. flattening when light is applied only flattens higher waves

Moore tells me that large number moulds haunt the openings on to keep the mould off the blanks -

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I noticed in one way mould that a small low wave ~~was~~ between 2 high waves was flat under mould while the 2 large or high waves showed not flat This is very strange & difficult to explain of tops are flatted by warping - Except that sand is forced into the hollow & sets or crafts metal

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Ottawa Cap. only of Kab. etc C for installed water is 7½ gal hour & storage Capacity 250 gallons

Aug 30 1920

I find it a general practice that when rubber hose is connected to a pipe only one turn of copper wire is made hence we have many disastrous results loss of electrolyte

The minimum turns should be 3 4 where it can be done 5 to 7 turns should be made —

Found Hoffman men were using alcohol with 19 grms $SnCl_2$ to gal —

Makes 2 doses [illegible] he is now to make it 2 grms per gal [illegible] do it [illegible] using $SnCl_2$ crystals

Note.

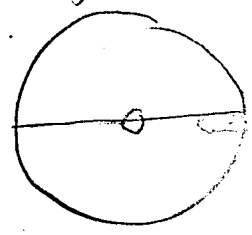
Aug 30 1920

For last 6 weeks We have averaged
Each day put in baths

10 Masters
22 Master females
68 2nd Masters
276 Working females

NOTE

Archer found 2 repeated
discs which showed blisters
These showed marks plainly
that belt had slipped
These blisters were at
the Edge just underneath



Blisters

Both discs same
Will save all blister repeat
+ follow this up

Sept 1, 20.

Note =

9 am - Baths were

	Spec g	H_2SO_4	B. Vitrol
22A	1.185	22.32cc	232.57
22B	1.190	22.03 "	226.92
24	1.190	23.36c	227.43

Preliminary

	Spec g	H_2SO_4	Blue Vitrol
Water —	1.155	23.24	207.92
2nd Nil 1	1155	24 34	201.25
2nd Nil 2	1150	24 80	208.22

Month ago our Copper Electrolyte had 17.47 grms Nickel to 1 Liter

Sept 1 - 1920 44 grms per liter

72 1%

Kasakoor Lestal Lab

Batho -

Lab -

Temp 80°

Spec G 1230

Amperes 15

Volt 9.4

Free H_2SO_4 11.37

Blue V per Lib. 249

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22 B -

Temp 86

Sp G 1175

Ampere 15.5

Voltage 6.5

Free H_2SO_4 22.13

Blue Vitriol 232.31

Smaller resistance probably due to greater amount of acid

This shows impossibility of keeping up acid to 25 grms per liter + close to it do controlling our amperages

Same old story.

Caldwell in Middle room between Daly & Moore gets very much high & [OK] records from Neil in Music room where it is quieter –

Sept 3/30

Latest developments

Polishing | Working
females, | 9 hrs.
work – average
for the 3 dress machine
5 moulds per hour

Note

Sept 3rd Saturday 1920

Gave order to Ramsey that starting Wednesday 6th morning all shifts put all moulds in nickel baths 10 Hours before putting in Copper baths

Sept 11 1920

Put plate glass 10" square in 22A 22B & 24 for

got 18 Milgrms from 22B Copper
got 13 Milgrms from 22B Nickel
27 " " 24
57 " " 22A

Mr. Edison

This is a stripping from a discarded mold put thru regular cleaning & Nickel, and kept 50 hrs in copper bath, using copper shot. The copper shot was very crude, being only first try at it. Fa

On ~~on Aug~~ 30/20 Took simultaneously from all presses. Whole load of records 1168 faces 584 Records —

All were tested by Neil & Caldwell finished 10th of Sept.

Neil was in Music room Caldwell in 4 bldg between Dallys & Moore room —

Neil's place more quiet hence higher reactions as Expected

Caldwell had 464 faces OK + 256 faces family Consc
39.6% Consc } 61.5%
21.9 " family Consc }

But records (total) only gives total 278 or 47.5% Consciences

Neil went over all of same records —

1170 faces 421 Comel & family Commencement Total 35.9 %

Records 587 —
141 Comel & family Comel.
Total 24 %

Resume.

Faces

Caldwell	61.5 % OK
Neil	35.9 % OK

Records

Caldwell.	47.5 % OK
Neil	24 % OK

Shows the immense difference between testing in rooms where quiet or noisy —

The greatest difference of all is this –

If moulds are printed & tester runs them on machine he will report few good surfaces mostly poor surfaces – But if they have been run over by the reproducer once & then carefully wiped clean he will report nearly all good surfaces.

The reason is that in groove where ball rides there is always a great number of points due to unknown causes These lift the ball & gives a sound & at same time crush to powder. If this is wiped out then they do not give any sound the 2nd time over

Everyday we will have
250 to 300 new working
moulds making 125 to 150
Records to supply new
~~new~~ Times replace worn
moulds —

Each one will be assembled
in a mould & Eye inspection
shows it is not injured —

2 prints are taken on
Reg blanks —

The first one is not used
Except for reference —

The 2nd Mould is run once
over by girls with approved
Reproducer

These 2 records go to the
Mould Testers. The 2nd
one is cleaned with
thoroughness by cloth &
brushes

It is tested for surface finish etc according to schedule Those not passed as OK take to pass to final Inspectors with Microscope Whole lot on — decide if repairable if so passed to Working Model Repair dept 2 or 3 men will probably be enough to Repair them —

The testers of the test Record must be in very quiet room. isolated from noises of factory. possibly out of the factory & away from Machines etc The only Carrying will be 300 records one cycle

We use about 2 lbs
of Metallic Selenium per
week
Its bought from a Concern
in NY City - It is
made by a Baltimore
Copper Refining Co
It is found in the mud
after anodes from Copper
Baths, Likely this
Co is owned by
the American Refining
& Smelting Co
We paid at one time
$1. per lb lately 2.75
lb We have
Sept 13 1920
110 lbs - over a years
supply - We should
keep 4 yrs supply

[117]

As the Co might give up saving it & we would want this time to get other Cos doing it

Sept 14/20

With only 3 days exposure it looks as if all Copper Nickel Anodes made from dross give in 24 hrs 1500 gals - an increase daily of 6½ grams NiSulfate per liter per day 390 baths

This is about 100 lbs daily of NiSulfate 320 oz. metallic to 2500 oz Cu metallic - about right Roughly

Archer Reports about
about trees etc

22 A Preliminary baths
"do you want skimmers
in the Cathode Chamber
still retained in baths
Master room"

I have noticed about
80% of Cases where trees
originate. There is no
skimmer in anode chamber
but could not positively
say at this time that
this is cause of trees

I have noticed when a
disc is Concave at Center
after running its full cycle
of plating when taken out
of bath it appears as if
solution was not up to
Center when plating

Also that when we

Sept 15/20

have a Coating center that
more nuts than usual
appear which will give
a granulated Center —

Varnishing backs of
Records with Regular
Rubber Dope from
Combn Rub Co —
Cycle
One coat 30 seconds
Rubber used each
Coat 35 cc
Oven temp 110° Fahr
20 minutes required for
Drying —
Hence Complete Cycle
3 Coats is 1½ Minutes
1 Machine Theoretical temp
320.8 Hours Must have 2 shifts

Tests of Records under
Varying Conditions of
Noise by Neill & Caldwell
20 Tunes 10 Records

Sept 15/20

Music Room OK for surface 60%
Hall outside Machine shop 80%
Machine Shop 100
Testing booths 2nd floor 100%
showing our Recg tools are Valueless

Sept 21 1920

Selected 4 Tunes for rough surface for true Echoes
Very loud Echoes & moderate Echoes doubling the Voice all way thru. Tried in Offices | Drafting Room Library - Each man noting on paper quality of Reproduction

Report on file in office,
Apparently public dont hear Echoes & not much of the loud surface (Especially kind) but I know even if they dont hear the defects it hurts the General Effect without their knowing it

By using glycerine
glass & dry gloves in
Celluloid dip room
find lots of filments
of silk settled down
this 3 days after
stopped dipping
also pieces of silk
also coal dust from
chimney of Compo
found 100 times larger
than could go thru
silk - showing the
cloth filter has been
full of holes for month
has blower put dust
over in it has been
worse than useless
+a positive injury
This shows necessity of
periodical inspection
by Head Office Inspection

Think best conditioner
is a filter pieces 36" frames
& Many frames — lightness
with this we can clean
Cloths easily be assured
no leaks, + get enormous
air filtering surface in
the very smallest space

Rubber backing No 1

20 gms Alsmith to 100 cc
Regular Combs R Co Dope.
Mixed in mixer well.
2 Coats dried in oven
at 110° Fahr. Each Coat
dries OK in 30 Mins, both
Coats 1 Hour.
Flowed on rough back of
Rubber Mould.
Plated thick - 50 hours
16½ amp — OK not a
single nub
a Duplicate shows
Considerable nubs near
Label no nubs 1½ from
Edge — nubs very easy
Come off with finger nail
No 2 Fred says this Dip is
rougher lots pin points
if these were roughed
down it would stop
nubs

No 3 is Dup of 1 + 2
Except 3 Coats

Only 2 or 3 rubs at Label
3 is OK.

4 Dup about 4 6 rubs =

All these 1 2 3 + 4
are OK for practical
work, ~~the~~ 2 Coats as good
as B coats, 2 Coats is OK
for those not as rough +
3 for very rough –

5

Same as above mix
but 1 Coat rubs all over
+ quite thick
Dup – Wonder

This is 5 grams glaconate to 100 Rubber Dope
~~#~~ 3 Coats not a nub out OK.

Dup- Not a nub- OK.
Fred says these were considerably smoother than #1 & 2 treated

Dup of above 2 Coats
1/2 day nubs at Label only

Dup- nubs at Label only
~~to~~

Dup but Only 1 Coat
Horrible nubs all over

Dup- Horrible -1 Cy
Sept 22 1920-

With .093 nozzle the 20 grams glaconate to 100 cc Combs R Co Dope puts 14 cc on disc once over or one Coat, we will use 2 coats on good & 3 Coats on Rough backs -

Sept 23/20

Scheme for sticking on tissue paper on Matrix to prevent injury -

100cc Alcohol
100 grms Rosin
10 cc Cotton seed oil

This appears good so far but perhaps should be 6 cc oil,

Weak hot soda solution Removes all -

Brushes phosbronz.

Wears scarcely any
Adopted on standard

Red Brass Cast

Wheatstone bridge 021 of
Ohm - Resistance
1/2 oz on Each prong
4.5 oz pressure Wear
Very smooth & to OK
Beats brass (yellow) - phos 6 OK

We are going to put a guard
Cover over contact springs
on disc holder to prevent
men from bending them.